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▼

When Atwell Jackson, our Sales Consultant, submitted his manuscript for this issue we were excited. Here is a known authority that is getting his feet on the ground in the telephone business. Needless to say we instructed him to dig up more along the same line. "Sales Stimulants for More Business" is right down your alley so read it and fire in your questions, there is no charge!

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TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

Vol. 43, No. 12 **December, 1939**

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Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 7720 Sheridan Road, Chicago, Illinois. Phone Rogers Park 3040. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice-President and Editor: L. M. BERRY ,Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $1.50; In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents. All Subscriptions should be sent DIRECT to 7720 Sheridan Road.

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"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

THE National Capital is preparing for a busy program of activities which will get under way upon the convening of Congress in January, but the major keynote of the Federal Government affairs will be political-wise.

The telephone industry will find a number of the governmental activities to be of considerable interest, but the outlook is that to a very large extent the developments will be in the nature of proposals or just "words" and will not be promulgated into governmental actions or enacted into law by Congress. The session of Congress promises little in the way of legislation, except the usual grist of appropriation bills and national defense as the main item on the Congressional menu.

For the industry, the most immediate development of importance will be the decision of the Wage-Hour Division on the application of the U. S. Independent Telephone Association for exemption of "learner" switchboard operators from the minimum wage rate. This decision, which will be based on the recent hearing before the Division, is not slated to be handed down until early January as the record in the case is not to be closed until Dec. 20th.

The developments on the proposal for permissive legislation to pave the way for a merger of the domestic landline telegraph companies, Western Union and Postal Telegraph, have been depicted in press stories as having reached a concrete stage. However, the progress in the merger situation is by no means as far along as has been reported. The FCC, which is preparing a factual report and legislative recommendations for the Senate Interstate Commerce subcommittee has just received the drafts of this report from its staff and has not reached any conclusions or decisions on the character of its legislative proposals. In fact, the indications are that the FCC is not going to be able to transmit its merger report to the Senate until the latter part of December, or even at a later date.

It was emphasized by FCC Chairman James Lawrence Fly during early December that the Commission still had an open mind and had made no determinations on the merger report so that the speculation in the press about the character of the projected legislative recommendations were premature and generally without any foundation. For the telephone industry, the future FCC proposals on the disposition of the teletypewriter exchange and leased wire services of the American Telephone and Telegraph Co. and Bell System in the event of a merger constitute the most important elements in this plan for the telegraph industry consolidation. While the FCC may in all probability recommend that a future merged telegraph company should have these telegraphic services, now operated by the A. T. & T., it is considered most doubtful that either the FCC or Congress would propose any mandatory steps to force the shifting of the TWX and leased wire services from the A. T. & T. to the projected Telegraph merger company.

The outlook is that, if Congress enacts legislation to permit the consolidation of Western Union and Postal Telegraph, those telegraph companies in the course of their merger negotiations could work out a plan with the A. T. & T. for the leasing of the TWX and private line systems on the basis of satisfactory compensation. But there are a number of obstacles which have to be solved before such a latter step could be undertaken—first, the A. T. & T.—Bell System plant facilities for TWX and leased wires are extremely adequate and efficient for the operation of these services and it seems illogical for the present plant setup for these services to be disrupted in being transferred to the telegraph company plant and second, there is the question of the employee force which operates the TWX and leased wires in the Bell System and it would appear a most impractical program to have this trained employee group displaced by a force of telegraph workers to handle these two services. The most likely outcome in regard to these telegraphic services of the telephone industry, if the telegraph merger ever does take place will be to have the TWX and leased wires operated by the telephone industry and to have the telegraph merged company conduct all the commercial operations in selling these services to the public and in handling the billing and collection of rates.

But, because the next session of Congress will be distinctly absorbed with politics and maneuvering for the coming Presidential election, these plans for the telegraph merger legislation as projected by the Administration and the FCC can easily fall by the legislative wayside without enactment, especially if the situation is charged with controversy as may easily occur be-

Phone Co. Speeds Up Lazy Tongues

The Associated Press carried this:

Washington, Dec. 8—Wage-hour administration officials learned today what telephone companies must overcome to train a girl as a competent switchboard operator.

Mrs. Mayme Workman, Springfield, Ill., a traffic supervisor for the Illinois Telephone Assn., testified at a hearing, they said, that all girls beginning their training have—

"Rigid jaws, stiff lips and lazy tongues."

cause of the bitter feud of the two labor unions—the CIO and A. F. of L.—in their present attempts to organize Western Union and Postal Telegraph. The FCC Telephone Investigation Report, according to all present indications, is likewise destined to be shelved in the next session of Congress. While it is doubtful if any Congressional leaders or even the members of the Senate and House Interstate Commerce Committees which would handle this report have given any consideration to the findings of the Telephone Investigation, Chairman Lea of the House Committee issued in a recent address a warning to the FCC that he was opposed to any Commission proceedings not based on fair and complete hearings and impartial decisions and this was interpreted to indicate that he would not look favorably on the Telephone Investigation Report because of the ex-parte character of that FCC Investigation.

FCC activities in regard to the telephone industry have been at rather a standstill. The most interesting development on the horizon will be the further consideration by the Commission of its jurisdiction over interstate interzone message rates in the extended Kansas City exchange area. The FCC is also making preparations for further proceedings in its projected investigation of Pacific Coast interstate toll rates, but when and whether hearings will develop in this inquiry has not yet been determined. Another subject of interest at the FCC is its forthcoming report on the use of radio by Great Lakes shipping and it is expected that radiotelephony is to be given the stamp of approval as the best communications method for the protection of navigation safety of shipping on the Lakes.

Independent Telephone Association Presents Need for Learner Pay Exemption

Stressing that added wage costs will force telephone companies to curtail operators' employment through greater mechanization, more speeding up of the work and possible elimination of rest periods, the United States Independent Telephone Association's request for an exemption of "learner" operators from the 30-cent-an-hour minimum wage, presented at a Wage-Hour Division hearing during the first week in December, met vigorous opposition from the two leading labor unions in the telephone field.

Five spokesmen for the Independent industry headed by John H. Agee, Association Wage-Hour Committee Chairman and Vice President of the Lincoln, Nebr., Telephone and Telegraph Co., and Louis Pitcher, Association Executive Vice President, described the added expense burden of increasing learners' pay to the 30-cent level which would cost 2,100 exchanges approximately $250,000 a year and might cause an even greater wage boost up to $1,000,000 because of the higher learner pay dislocating the regular series of wage increases for experienced operators. The 10,000 other Independent exchanges with less than 500 stations are completely exempt from the Wage-Hour law.

The labor unions which interposed vigorous objections at the Wage-Hour Division hearing before Assistant Chief Gustav Peck of the Hearings and Exemption Section to the minimum wage exemption were the International Brotherhood of Electrical Workers (AFL) and the National Federation of Telephone Workers, the comparatively new independent telephone union which now represents 97,000 workers, practically all in the Bell System. The two unions presented nine witnesses, six of whom were working switchboard operators in Bell System companies, who contended that the 30-cent level must be maintained for learner operators and presented arguments to show the operators commenced the handling of commercial calls after two weeks' training. The contention of the Independents was the instructiton period lasted for three months before the operators became productive workers.

The Independent Association is planning to file a brief as well as statistics to show the breakdown of the 2,100 exchanges seeking the learner exemption into the population groups of their communities and to show the relation of the added learner wage cost under the minimum wage to the total operator pay expense for the Independent industry.

As the two labor unions made a definitely strong impression upon the Wage-Hour officials of the need for maintaining the minimum wage levels to retain the present standard of pay for operators, it was speculated that any granting of an exemption would be confined to the smaller communities and not to the exchanges in sizeable cities or towns. Presiding Officer Peck, together with Wage-Hour Counsel Norman Altman and Economist Dallas Smythe, directed their questioning to a considerable degree at the 20 per cent turnover in Independent operators with the indication that this was caused mainly through the below-minimum starting wage. They also stressed their examination as to when operators actually took over the handling of commercial calls on the switchboards with the apparent leaning that such a step marked their commencement of productive work.

The testimony of the labor union representatives was featured by the fact that neither James Preston, IBEW international representative, and Miss Grace Barry, head of the IBEW operators, nor S. M. Adams and J. A. Beirne, National Federation of Telephone Workers officials, together with five operators, presented criticism of their wages and employment conditions in the Bell System, but centered their attention upon the proposal to have learner operators receive wages below the minimum. This was most unusual in Wage-Hour hearings as it is almost axiomatic for labor union witnesses to use this government agency as a forum for assailing the practices of their employing companies. The IBEW and National Federation spokesmen agreed that dial mechanization, together with the new cross-bar system was increasing and tended to reduce operator employment, but they appeared to accept this trend as inevitable to improve the service and not utilized by management to displace employees.

One highlight of the labor union testimony was the statement by Miss Grace Barry, New England Telephone and Telegraph Co. toll supervisor at Boston and IBEW operators' head, that there had been "no operators discharged by the New England Telephone and Telegraph Co. as a result of the conversions to automatic dial service." She related that the operators displaced by the dial had been shifted to manual exchanges or given other posts. The dial conversion had tended to reduce the number of student operators, she declared.

The testimony of Mr. Agee centered upon the dangers of lessened employ-

(Please turn to page 36)

Convention Dates

Minnesota Telephone Association, Hotel Radisson, Minneapolis, January 23, 24 and 25, 1940.

Texas Telephone Association, Mar. 19, 20 and 21, San Antonio.

Kansas Telephone Association, April 3 and 4, Hotel Kansan, Topeka.

Nebraska Telephone Association, Hotel Fort Kearney, Kearney, April 9 and 10, 1940.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 8 and 9.

Pennsylvania Independent Telephone Association, Yorktowne Hotel, York, May 16 and 17, 1940.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, May 28 and 29, 1940.

New York State Telephone Association, Hotel Syracuse, Syracuse, June 5 and 6, 1940.

A Christmas Message

In our hurly burly bustle of modern business—telephone and publishing are definitely in that category—we were guilty of inadvertently eavesdropping the other day. Christmas was coming and we were anxiously awaiting that time, but in the meanwhile business held sway.

THE SCENE: *The office of an advertising manager of one of our leading advertisers.*

THE ACTION: *The advertising agency was presenting the Christmas Greeting they suggested should be sent to all customers.*

Adv. Mgr.: Hmm, beautiful, but (excitedly) what do you mean with this heading "Peace on Earth", (emphatically) WHERE?? —(It was changed).

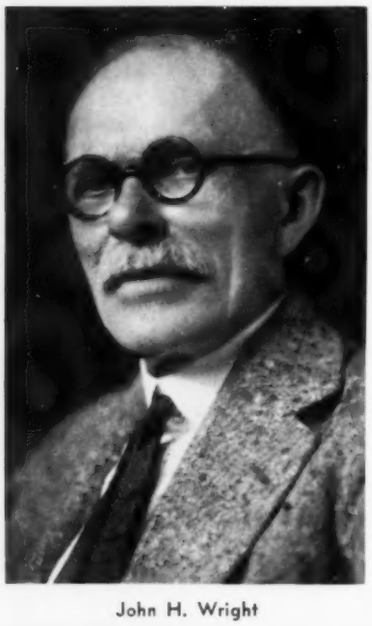
With the knowledge that unhappiness and death are stalking in some parts of the World—that even Santa had been legislated out of his cheery duty to the young—we are a bit more sober in our thoughts and wishes for the Christmastide. To those who believe that the Christmas Spirit should be preserved—we dedicate our wishes for Happiness during the Holiday Season.

Especially do we wish to greet those of our industry—operating companies and manufacturers and suppliers who have so bountifully aided us in giving the industry a trade publication that is now larger and more widely circulated than at any time in its 30 years of serving the telephone industry.

J. A. SMITH

NEW ASSOCIATION VICE PRESIDENT

John H. Wright, newly elected vice president of the United States Independent Telephone Association at the recent convention held in Chicago, brings into active service an experience of many years as an active Independent. At present he is president of the Jamestown Telephone Corporation, Jamestown, N. Y., which he joined in 1903. His active service in the telephone industry started in 1897 with the Warren (Pa.) Telephone & Telegraph Company as secretary and general manager.



John H. Wright

Besides his Jamestown affiliations, he is also an officer of a number of operating companies in New York and Pennsylvania. At present he is president of the Pennsylvania Independent Telephone Association and has long been active in association work in that state. He has also served as director of the National Association and is a past president of the Independent Pioneers Association.

Known as a fearless fighter for his rights, Mr. Wright is also known for his photographic genius that started as a hobby and has progressed into a thorough knowledge of that field. His sound camera and color movies show a professional touch that we doubt has an equal in the amateur field. His color movie and sound camera accompany him on his many travels and has resulted in invitations to show them before noted invited audiences. His photographic laboratory is, we understand, the most elaborately equipped of any amateur in the world.

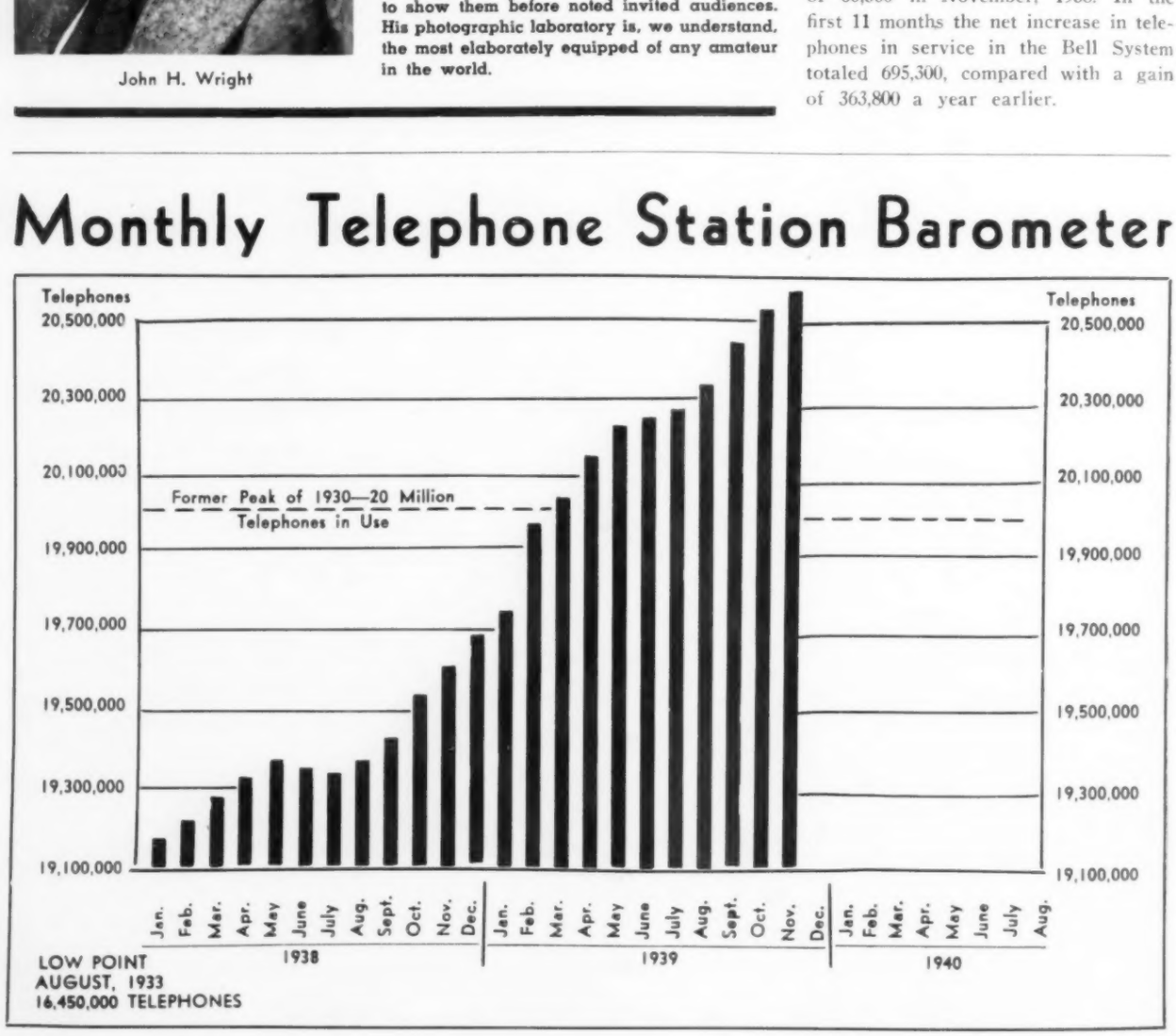
General Telephone Reports More Lines

General Telephone Corporation reports for its subsidiaries a net gain of 1,616 company-owned telephones for the month of October, 1939, as compared with a net gain of 1,562 telephones for the month of October. The net gain for the first ten months of 1939 totals 19,914 (exclusive of purchases and sales) or 4.16 per cent as compared with a net gain of 12,383 telephones, or 2.79 per cent for the corresponding period of 1938. The subsidiaries now have in operation 497,589 company-owned telephones.

Station Gain

The American Telephone and Telegraph company announced Dec. 5, an increase of 81,000 telephones in service in November, compared with a gain of 86,900 in October and an increase of 60,300 in November, 1938. In the first 11 months the net increase in telephones in service in the Bell System totaled 695,300, compared with a gain of 363,800 a year earlier.

Monthly Telephone Station Barometer



Aerial Cable Maintenance

By
RAY BLAIN

Illustrated by the Author

Aerial ladder on a truck which will be found most useful in making inspections and repairs to aerial cable. (Photo courtesy—Highway Trailer Co.)

THERE is probably no part of the telephone plant where preventative maintenance pays larger dividends than on aerial cable. There are so many little things which if neglected will in time cause serious interruptions of service. The correction of these faults do not take a great amount of time and may be accomplished at off times by the regular maintenance force. In this article an attempt will be made to outline briefly how routine inspections of aerial cable may be conducted. We do not claim that the plan here outlined is perfect or meets every requirement but we do believe that it may be modified to meet local conditions in almost any telephone exchange.

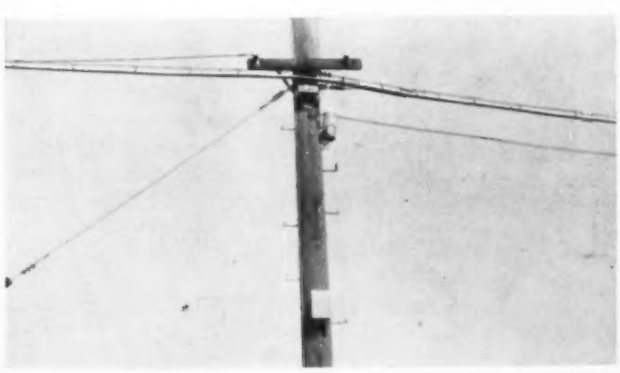
Cable Rings and Ring Cuts

CABLE rings of the modern variety do not ordinarily cause trouble if carefully selected and properly installed. Rings should always be of a type suited to a certain size of cable and sized to fit accurately the messenger strand being used. If rings fit the messenger loosely they will slip on it and cause the cable to loop down in the space where it is not properly supported. This loop will generally absorb the vibration in the span and cause the sheath of the cable to crystallize and become porous so that moisture can enter. Aerial cable leads should be checked over at least twice a year and all slipped rings replaced. This operation will not require much time and it may be the means of preventing several serious cases of trouble.

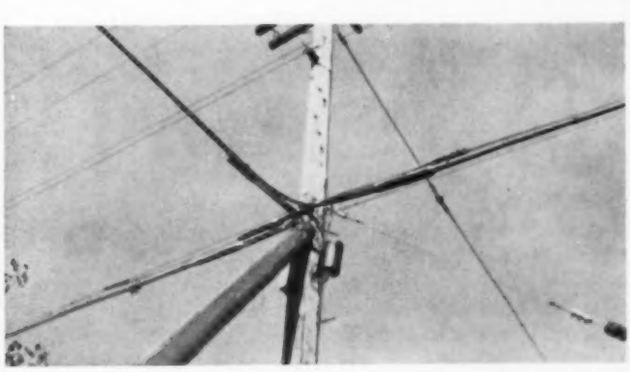
Ring cuts continue to cause considerable trouble on aerial cable. These ring cuts ordinarily occur on at least two rings on each side of the poles. The sway or swing of the cable and messenger is supposed to cause a twisting action of the cable in the rings. Dust or rough inner surfaces of the rings, or both act as an abrasive which rasps away the lead sheath of the cable. It is not uncommon on many old cable leads to find the sheath cut entirely away at each pole for the entire length of the lead. Naturally when a cable reaches this condition it must be replaced immediately if it is expected to continue to give service. However, serious ring cuts can usually be avoided or checked if proper precautions are taken in time.

The most common method of preventing ring cuts is to install special rings or saddles to support the cable at each pole. Various types of these special rings which have proved entirely satisfactory are now on the market but due to limited space only a few will be described here. Cable shields are available which consist of a metal protective band that clamps around the cable and is held firmly in place on it by a small stove bolt. This metal shield is rather hard and will relieve the softer cable sheath from being cut by the regular type cable ring. The only difficulty with this method is that a slight movement of the cable is liable to cause the shield to move off the cable ring and lose its protective qualities.

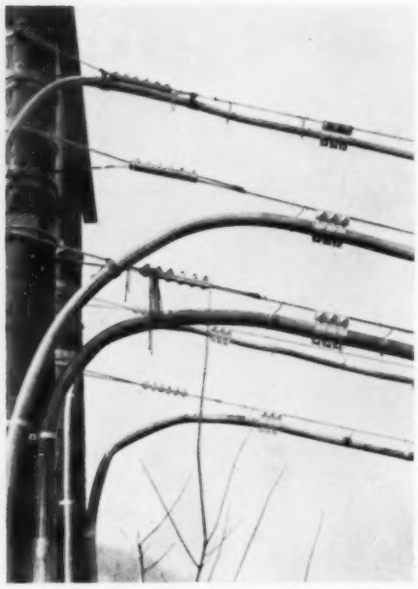
ONE type of ring designed to prevent ring cuts has a special porcelain saddle which is quite smooth where it contacts the lead sheath. This ring is sprung and exerts a tension which holds it in place on the messenger strand in the same manner as the ordinary cable ring. This ring is easy to install after a little practice. Another type of hanger or clip consists of a wire hook which



Often old type cable terminals cause serious leakage of cable and should be replaced immediately.



On all special corners such as the one pictured here grade clamps should be used to hold the cable in place.



LEFT — On all deadend poles where aerial cable connects to underground grade clamps should be used to hold the cable firmly in place and prevent it from pulling against the cleats of the pole which will cut the sheath in a very short period of time.

Grade clamps should be used to hold all cables in place on aerial to underground poles.

is placed over the messenger and a metal strap attached to it circles the cable and is cinched in place. This arrangement provides a hinge action between the cable and the strand which absorbs the twisting action of the cable.

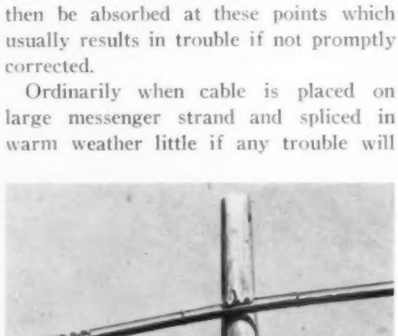
Various other types of cable hangers utilize the metal strap and saddle arrangement. Some of these hangers permit the cable to be supported in continuous contact with the messenger or several inches below it. Some construction men take advantage of his principle and adjust the hangers so that they are longer at the poles than in the span to prevent the hump in the cable at each pole. The cable spinner is now being used to some extent and is supposed to eliminate for all time the possibilities of ring cuts. This is accomplished by lashing a wire around the cable and the messenger strand in one continuous operation. A special machine is used for this purpose in much the same manner as the old marlin spinner familiar with most old timers. In our opinion the modern spinner is still in the experimental stage.

Often in a growing exchange one is tempted to place two cables in one set of rings. When working lines exceed the capacity of a certain cable it is an easy matter to prove that the installation of a second cable, run parallel to the existing one is cheaper than replacing it with a new and larger one. However, two cables in one set of rings will never prove an economy. The two cables will jam down in the rings and place extra pressure on small areas of the cable sheath and usually cause trouble. When two cables must be placed on one aerial cable lead and a second messenger is not considered desirable, then use special long rings which are placed between the regular rings and support the second cable below the regular one.

Bows in Aerial Cable

BOWS often cause serious trouble on aerial cable. This bowing frequently occurs on cable which is placed on a supporting strand strung too tight. The unequal expansion and contraction of the lead cable and the steel strand from summer to winter causes the difficulty. The longitudinal strains placed on the lead cable will concentrate at certain points causing it to buckle and bow. The natural vibration of the span will then be absorbed at these points which usually results in trouble if not promptly corrected.

Ordinarily when cable is placed on large messenger strand and spliced in warm weather little if any trouble will be experienced from bowing. However, when the cable is strung and spliced in cold weather serious bowing will most surely occur with the higher temperatures of the following summer. This difficulty may be corrected to some extent by the use of lower strand tensions than formerly used on aerial cable. Perhaps the best method to prevent the occurrence of bows in new cable when it is strung at low temperatures is to splice it under tension. With this method the cable is stretched an amount which approximately equals that which it may be expected to expand during the higher temperatures of the following summer.



Shields clamped on a cable to protect the lead sheath from the cutting edges of the rings.

While the previously mentioned method will effectively prevent bowing some means must be used to eliminate bows already formed on existing cable. The slack caused by a bow may be simply cut out of the cable and a lead sleeve wiped in place though this method will not eliminate the cause of the trouble when it is due to the supporting messenger being strung at too high a tension. Perhaps the best method to use in the average case is to slack off the messenger. This can ordinarily best be accomplished at a deadend by splicing on a new length of messenger strand in an approved manner and slacking the strand the proper amount. Before this is done all suspension clamps on the lead should be loosened and care taken to make sure that all stub cables are in the clear at terminals. It will also probably be necessary to throw a handline over the cable in the center of each span and have two men ride it a few times to equalize the slack to properly remove the bows.

When making repairs to cable it is never a good plan to swing a platform in the center of a span unless one or two extension ladders are set in place and lashed to the messenger strand. If this is not done a large amount of slack is pulled into one span and when released will tend to compress the cable and may cause a bow to form. The use of ladders is also a convenience and much safer for the workmen.

The Use of Grade Clamps

GRADE clamps of several different designs are now available which may be used to advantage on all cable and messenger of various sizes. Some of these clamps are adjustable in order that one size of clamp may be used on various sizes of cable. When used to hold a cable in place on a grade the clamp is ordinarily placed on the lower side of the pole and two or three feet from it. The frequency at which clamps will be used will depend upon the steepness of the grade and it is always much better to use plenty of clamps in order that the strain will not be excessive on any one clamp. Grade

(Please turn to page 32)

Short Course in Telephone Transmission

By
B. C. BURDEN

Telephone Repeaters — Part 2

Types of Repeaters

IN THE November issue of **Telephone Engineer** the basic story of the telephone repeater and its balancing circuit were discussed. In this article we will review the principal features and theory of the modern two wire and four wire types of telephone repeaters. Repeaters are classified as to their method of insertion in a circuit as, (1) Cord Circuit Repeaters, (2) Terminal Repeaters, and (3) Through Line Repeaters. The three types are illustrated by Fig. 1.

A cord circuit repeater is one which is terminated on a cord circuit on the toll switchboard and so arranged that an operator can connect the repeater in any of several toll lines which are so arranged that they will work in harmony with the repeater.

A terminal repeater is one that is permanently connected to the terminating end of a toll circuit so as to amplify either the weakened incoming voice currents before they pass on to the local subscriber or to amplify the outgoing voice currents from the subscribers telephone before being impressed on the telephone toll line.

A through line repeater is one which is inserted at an intermediate point in a toll line so as to amplify the weakened voice current coming from either direction.

The actual construction of the above types of repeaters are practically identical with the exception of the arrangement for balancing the internal impedance of the repeater against the line impedance. A **balancing network** is a vital part of every repeater and this item is discussed in a subsequent paragraph.

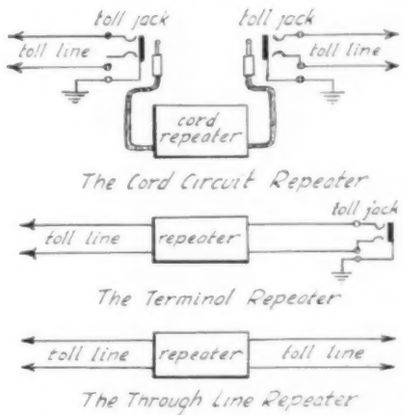


Fig. 1—Three Types of Repeaters

Cord Circuit Repeaters Not Popular

THE cord circuit repeater is no longer popular with the large operating companies and has been largely replaced by either terminal or through line repeaters. A telephone repeater cannot be inserted between two lines requiring amplification, without some type of balancing networks suited to the lines involved. A repeater will oscillate and distort unless the impedance characteristics of the line and the balancing network in the repeater are carefully adjusted, and it is for this reason that cord circuit repeaters have not increased in popularity. That is, each toll line with which a cord circuit repeater is used must be equipped with a balancing network and pad which is inserted in the circuit when the repeater twin plug is placed in the toll line jack. All of this increases circuit complications and possibility of repeaters not functioning properly.

In the November article, Figure 5 showed what was termed a "practical repeater circuit" using a single vacuum tube. Though this circuit which is shown below as Figure 2 is practicable it is no longer used because of certain inherent disadvantages. One primary disadvantage was the fact that incoming energy arriving, let us say from the west line passes through the vacuum tube and is amplified and one-half of the amplified energy travels on to the east line while one-half travels back to the west line and thus serves no useful purpose. When an attempt was made to use several of these single element repeaters in tandem, difficulty was experienced due to the feed back energy causing oscillation or "singing," as it is termed, of the repeater. On long toll circuits the use of the single

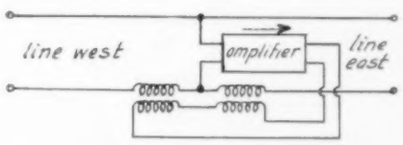


Fig. 2—Single Element Repeater Schematic

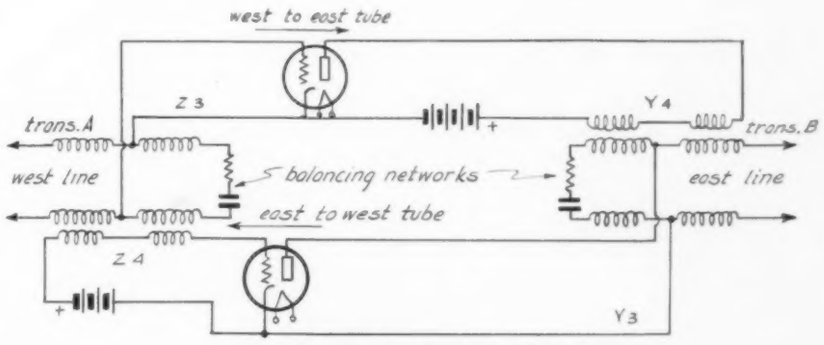


Fig. 3—Two Element Repeater Schematic

element repeater arranged as shown in figure 1 also resulted in serious **echo effects** due to the time required for the voice waves to travel back toward the sending end of the line after passing through the amplifier.

The Two Element Repeater

In order to overcome the disadvantage of the single element repeater one was developed which used two amplifying elements and two balancing networks. Figure 3 illustrates in simplified schematic form the basic arrangement of such a repeater. It will be observed that it consists essentially of two complete balancing transformers, two vacuum tube amplifying units, and two balancing networks. The balancing networks consist usually of a simple resistance and condenser in series and having such value as to approximately simulate the impedance of the line to which they are connected. If the circuit of Figure 3 is carefully studied it will be noted that it consists essentially of two of the single element repeaters connected so that each amplifying element handles the voice waves in one direction only. The principal advantages of this arrangement over that shown in Figure 2, is the fact that under ideal conditions, that is, when the impedance of the balancing network is exactly equal to that of the line no incoming energy from the sending end of the line will be reflected back to the sending end as was the case with the single element repeater.

The Theory of Action of the Two Element Repeater

IN ORDER to obtain a good understanding of the theoretical operation of the repeater shown in figure 3 let us follow a call coming from the west line, that is, when the west line is

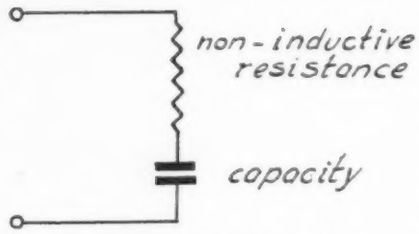


Fig. 5—Simple Balancing Network

transmitting and the east line receiving. In this condition the incoming voice curents would develop a voltage across the input to the **west to east** amplifier tube and this voltage would be amplified and would appear in the output circuit Y4, and one half of this output energy would pass on to the east line, while the other half would pass into the balancing network where it would be dissipated. Thus the west to east voice currents would be amplified. Now going back to the balancing transformer on the west line we stated that the incoming voice current would develop a voltage across the input to the **west to east** amplifying tube. The incoming voice current would also develop a voltage in winding Z4 and this would set up currents which would result in part of the incoming energy (approximately one-half) being dissipated in the plate circuit of the **east to west** amplifying tubes.

It is important to note, also, that none of the incoming energy from the west line is dissipated in the balancing network for due to the polarity of the several windings of the balancing transformer no voltage is created across this network when the energy is received from the west line. Now, considering the east balancing transformer (B), we stated that one half of the output energy from the **west to east** amplifier passes on to the east line while the other half is dissipated in the balancing network. You should also particularly note that none of the output energy (under the balanced condition) appears across the input (Y3) to the **east to west** amplifying tube. This is highly important to the successful operation of the repeater for any energy that appears across the input circuit (Y3) when the transmission is from **west to east** would result in this energy being amplified and appearing in the output circuit Z4 and passing back to the west line and would probably cause "singing" of the repeater.

Transmisson East to West

Transmission from **east to west** is accomplished in exactly the same manner using the **east to west** amplifying tube, in other words, voice currents coming from the east line arriving at balancing transformer (B) generates a voltage due to the polarity of the connection across the input circuit (Y3) to

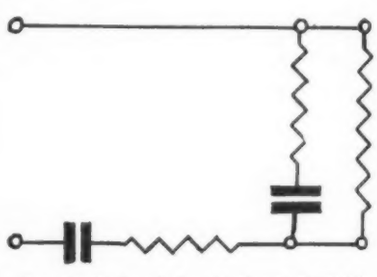


Fig. 6—Network for Un-Loaded Cable

the **east-west tube.** This energy passing through the vacuum tube is amplified and appears in the output circuit Z4 where it induces a voltage in the line winding of the transformer causing one half of the energy to pass on to the west line and the other half to pass into the balancing network where it is dissipated. Under the ideal balanced condition no voltage will be generated across Z3.

Summing up the energy division in the two element repeater, we can say that under the balanced condition one half of the incoming energy, (3 decibels) will be wasted while the other half will be amplified. At the output of the amplifying element one half of the energy will pass on to the distant line and the other half will be dissipated, hence the overall fixed loss of the repeater in 6 decibels plus the usual core losses of the transformer. Hence, the amplifying unit itself must supply at least a gain of 6 decibels before any actual net gain will be available for boosting the incoming voice currents. Fig. 4 illustrates this division of energy in the two element repeater.

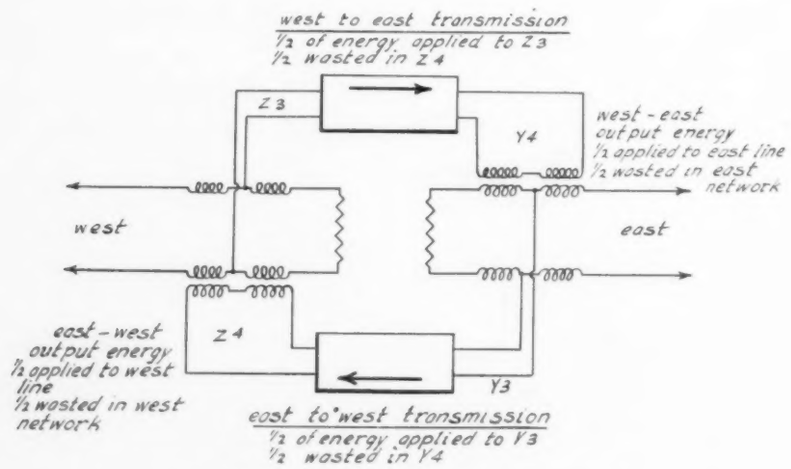


Fig. 4—Division of Energy in Two Element Repeater

(Please turn to page 25)

Sales Stimulants for More Business

By ATWELL JACKSON
Sales Consultant
for TELEPHONE ENGINEER

"My possibilities are few and far between," said Billings, "and frankly, I think I know everyone worth knowing in my community — at least between myself and the three fellows I have in the company—we know 'em all."

I was talking to Billings, during the recent national convention of Independent Telephone Companies, in Chicago and he was telling me the many reasons why he could not do much expanding.

In fact he continued, "Now look at it this way—I do a little advertising in the papers, send out a folder every now and then—and on top of it one of my men spends all his time out seeing people—and the other two about half of their time as well as what I put in myself. Every now and then some new face comes in to see me, or I meet new friends through the Rotary Club, but even if I do miss up on one now and then, its cheaper than continuously canvassing—even if I did get a few new accounts that I would not have gotten otherwise."

"True," I replied, "every word true —but there are two ways of getting business, (1) Increasing business from present customers, and (2) Getting new customers. How many department stores and specialty retail stores do you have in your locality?"

He named the number; and then I questioned him as to the number of grocers, and other retail establishments that had a local selling job to do. He had by the way a company serving around twenty-five hundred accounts in the mid-western territory and had spent a life time in the telephone business.

"Now," I said to him, "let's take that as point number one. You have several hundred retailers in a half dozen small towns. They have competition in the big city not over forty miles away. What do they do about it? Of course local advertising in the local papers—handbills and so forth—but the bigger city papers coming into the town prac-

QUESTIONS & ANSWERS

Address questions to MR. JACKSON

Question—Do you find the printed presentation is more effective than an oral presentation?

Answer—Printed presentations when used in conjunction with an oral presentation develop a third-dimensional form of selling which is hard to beat.

Many printed presentations seem to fall flat—and this is due to the lack of ease in its use. Too many salesmen when using a printed presentation develop the mannerisms of a "school-marm" instead of a conversational style of delivery that is convincing. In other words, the presentation is used to illustrate the points, whereas the oral presentation which accompanies it can have the benefits of voice-inflection and enthusiasm which adds life to the presentation.

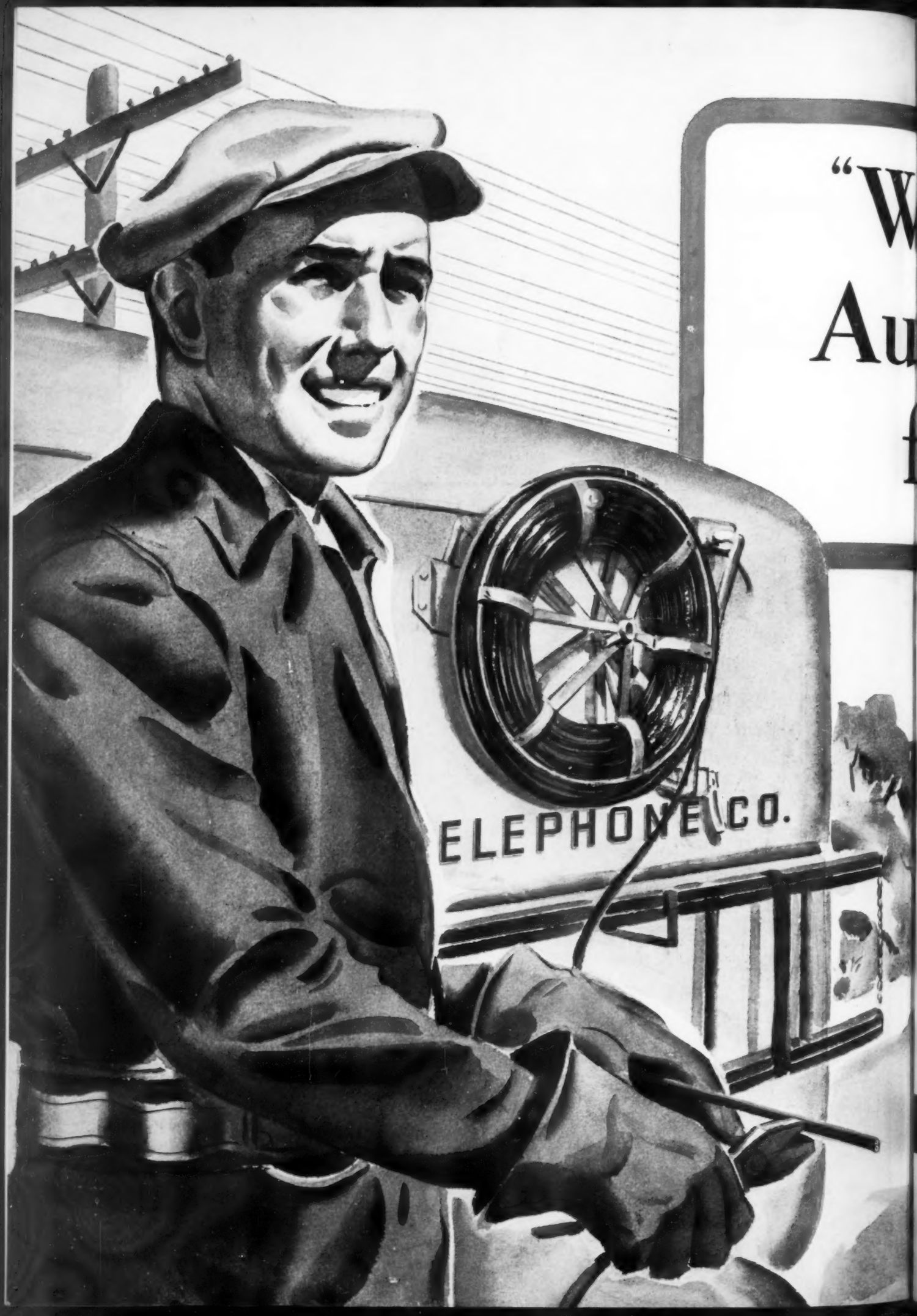
In the use of printed material; whether a visualizer type of presentation, or merely a printed piece of advertising material; the user should cultivate a delivery that emphasizes the "reason-why" elements in selling. The salesman who is making the presentation should have a firm understanding of the transition steps in his presentation and use the illustrated material to enhance the presentation rather than to use it for lecture purposes. In an early issue, the use of sales visuals and presentations will be taken up in full detail.

Question—Would you suggest our printed advertising material to our entire list?

Answer—This question is rather indefinite. If you mean your list of both subscribers and non-subscribers as your entire list, that is one matter. If you mean your prospect list it is quite another. However when considering the subject of mailing lists let us look at it in perspective, then you can be the judge as to just how you govern a mailing. REMBER THIS VITAL POINT — A MAILING HAS A DEFINTE PURPOSE or there should be no mailing. Therefore let the definite purpose of the mailing suggest the type of list. If you are sending out a piece of mail that has to do with the generalities of your institution and the various services of a telephone —then send it to everybody. If however you are sending out a mailing to encourage the economy of a phone in the home, then it is logical that only non-subscribing people should get the material.

As a constructive suggestion, I personally believe, if your community is not a very large one that I would break down my prospect list into classifications and send letters with enclosures. If you have listings of railroad men, factory workers, etc., you letter can dwell upon the specific use of the telephone in their specific case and an enclosure can back up your general publicity service and quote prices etc.

Mailing direct-by-mail advertising is like any other form of promotion or merchandising; if you have a purpose or a reason for doing it then follow out that purpose or reason. If you merely want to "get out some mail"—then that is bad form of promotion and has little opportunity of success with any type of list.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MAKE

Why do we go to Automatic Electric for supplies?"

"WELL, take this drop wire for instance. It's called Monotype, and uses Copperweld wire. It has a steel core welded to a thick copper covering, and will stand a terrific strain. That means when I once put it up, it stays up, and I don't have to go back in a few months to do the job over.

"Even their smallest items are always highest quality. When the job is done, we never get customer complaints on performance, because every Automatic Electric product is designed for a particular job and for telephone use only.

"Our superintendent used to buy tools wherever he could get them cheapest. Now he gets them through the Automatic Electric supply service, too—well known products such as Klein pliers, Estwing hammers and so forth. He says he saves several times their cost every year in reduced breakage and better workmanship. I certainly agree with him 100%."

Perhaps you could save money by checking into your supply situation and finding out if your supplies are: 1st. designed exclusively for telephone use; 2nd. highest grade products of well known manufacturers; and 3rd. shipped to you swiftly, carefully packed and at uniformly low prices. Automatic Electric's supply service unfailingly meets all three of these important qualifications. Will you try us with an order?

AUTOMATIC ELECTRIC

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Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LIMITED

Value of Telephone Greater Than Cost

A newspaper editor in an Ohio agricultural community recently expressed his opinion of the telephone to his readers as follows:

"We should think that one of the last things a farmer would want to do without would be a telephone. It is said that a large number of farmers have had their telephones taken out the past six months as a measure of economy. In most cases no doubt, they get along without them; they did in the early days. But in many families it will be found that the necessity for the telephone just once, will more than pay its cost. In case of fire or accidents on the farm, the telephone is sometimes a life-saver.

"A doctor may be wanted badly in the middle of the night; a valuable animal may become suddenly ill; an accident may endanger the life of an individual—all or any of these make a telephone almost indispensable. Many farm women have little communication with their neighbors except through their telephone.

"The women use it ten times where a man uses it once. The farm women are entitled to all the luxuries—if we may designate a telephone as a luxury—that can be provided on a farm. They earn all they get in that line, and more.

There may be instances where it is impossible just now to maintain a telephone but the farmer should think twice and thrice before he orders it taken out."

tically smothers your small town dailys and the people who should be spending money in your home town are not doing so because the circulation is not reaching them under the best conditions."

And naturally Billings inquired, "So what?"

"So this . . ." I replied. "Let us work out a little plan right here and now that will appeal to these retailers to at least double their business with you. They have your service at present —that is, practically all of them. Well let us work out a plan which will sell them, at least to start with ONE ADDITIONAL TELEPHONE FOR SALES SERVICE. First let us sell them on the idea of the telephone to get the local business they deserve. Your department stores and your grocery stores are your best bets because they have specials which can be offered as inducements to come into the prospect's store or an appeal to deliver etc. Inasmuch as these stores now have your service, SELL THE IDEA THAT THE PRESENT SERVICE SHOULD BE FOR **INCOMING CALLS** and that the new additional service should be for outgoing calls and nothing but outgoing calls to stimulate business and get the trade that is going to the big city. Plan is as simple as "A-B-C", because you are helping a local merchant solve one of his problems and you are helping your own business as well."

Billings thought the idea a good one and we proceded to work out the plan in detail. We decided that a letter should be written to break-down the cold call and then followed up with a personal call. We took a block of names and staggered the mailings of the letters to tie-in with the sales call; that is instead of sending out several hundred names in a batch, we selected enough names each day whom Billings and his assistants would be sure to see within a brief period following, and mailed them on that basis.

That plan of operation kept the program under control, but gave a specific task to be done each day that enabled better management and closer check up, because due to this method, every name was sure to be called upon while the issue was still fresh on the mind of the prospect. The letter which was sent is very simple, it read something as follows:

> "We have an idea that will help you meet big city competition and cost you only a few cents each day. The idea is practicable, proven, and one which you can readily see will produce results.
>
> Within the next few days, I'll call on you in person or have one of our staff drop in to explain this matter to you in detail.
>
> It won't take long—and the few minutes invested will pay you big dividends."
>
> (Signed by president of company)

Prior to any activity we worked out and mimeographed about a half dozen pages on suggested telephone-selling plans and sales talks, knowing that when the call was made with a complete proposition our chances for selling the idea would be increased.

The results of this program can not be calculated at this time because it has just started; but before the first hundred names were called upon nearly 4% increase in number of stations has been realized, and if that can be considered a criterion, then it is safe to anticipate close to a 10% increase in stations with the possibility of an ultimate of 15% through later follow-up and added service on the part of those who are using the plan.

Nearly two months have passed since this thought was discussed and worked out with Billings and two months which have been very profitable and productive to him.

After all, selling telephones is little different from selling any other type of commodity. First look for the problem of the individual or the group of individuals and then fit your service into overcoming the problem.

One of the biggest problems that the small town retailer faces today is the danger of competition from the big city. In many small towns the big city has established branches in grocery, department, drug, tobacco and almost every other form of retailing establishment. There is no need for me to introduce a discussion on chain stores into this article — it is probably well known to all of the readers—but even at best IT HAS BEEN A BIG BLOW TO EVERY LOCAL RETAILER, AND ONE THAT IS HARD TO MEET.

The competition of the big city store can be met by the local retailer and the TELEPHONE IS THE ONE INFALLIBLE MEDIUM BY WHICH IT CAN BE DONE. The telephone goes into the home of the local dweller and it is there that the point-of-sale can be established by the local retailer if he is wise.

There are ways of selling by telephone other than making a pest of one's self, for when the grocer calls the home owner and tells of his specials for that day, of his delivery service and other selling features, he gets and holds attention, he makes sales and brings back lost customers. When the local department store can counter with feature items that will compete with the ads in the big city papers, and call the local shopper to tell about it and the local store—additional business will come in. Even the hardware store at seasonable times of the year can feature this service; the lumber yards, the coal yards, everyone who has something to sell the local dweller can utilize additional phone service to bring in more business.

The telephone company in projecting this plan should always sell the idea THAT A SEPARATE PHONE SHOUD BE USED FOR OUTGOING CALLS. Never interrupt the incom-

Atwell Jackson

As Sales Consultant for TELEPHONE ENGINEER Mr. Jackson will diagnose your sales problems at no cost to you.

ing service to put on any kind of selling demonstration, for folks trying to get the number and being unable to do so will hang up in disgust and spend their money elsewhere. But with one or more telephones to take care of the outgoing sales calls, without any listed number, the sales person can go ahead with assurance that no harm is being done.

It is within the limitations of every company to follow the plan of Billings and adopt a similar plan. All that is necessary is at least a letter of a thought provoking and stimulating nature to precede the first sales call. Then the sales call to be made on schedule following up the letter. The only other matter needed is a few sample forms of solicitation to be used by the subscriber to build business.

The strength of selling should be stressed to the retailer that he can get the local business which he deserves, but it must be done on an organized basis and that is to USE SEPARATE SERVICE FOR SELLING CALLS.

A SHORT COURSE IN TELEPHONE TRANSMISSION

(Continued from page 20)

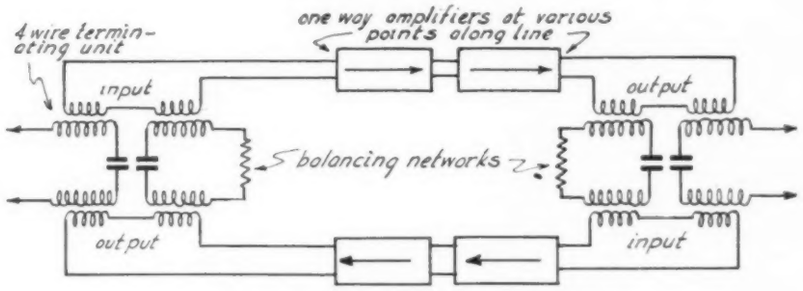

Fig. 8—Four Wire Repeater Arrangement

Balancing Networks

AS WAS stated above, in the two element type of repeater two balancing networks are necessary to balance the impedance of the line and thus provide the Wheatstone Bridge effect which is necessary to prevent "singing" in a repeater. A non-loaded open wire line has a characteristic resistance which is approximately constant and a negative reactance. The impedance of such a line can therefore be balanced by a combination of an ordinary resistance and condenser arranged in series, as shown in Figure 5. If the repeater is used with non-loaded cables a more complicated network is necessary and a schematic of this network showing three resistance and two elements is given in Figure 6. Repeaters which are used with loaded cables require a balancing network which includes resistance in series with an inductance and capacity as shown in Figure 7.

The problem of the balancing network is greatly complicated when the telephone circuit is a part of a phantom group and an addition carries simplex or composite telegraph circuits. All of this added equipment must be included in the balancing network either by the actual connection of duplicate equipment or by the insertion of corresponding amounts of inductance and resistance. In many cases it is more economical to use a complete set of duplicate equipment than to attempt to stimulate the impedance by other means. The duplicate equipment is connected in the balancing network in the same relationship that it has in the line itself.

An ideal circuit on which to place

(Please turn to page 28)

For the Business Office — as well as the Toll Board

•

Dating and timing your mail is as important as any other office practice.

•

For over 25 years Dorson has been making timing devices. The $22.50 Tolltimer and the Dorson Time Stamp which sells for $17.50.

•

Telephone companies have been using time stamps in their front office for many years.

•

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F. O. B. factory

For better and cheaper ringing.
No Radio Interference
30-day free trial
TELKOR, Inc.
ELYRIA, OHIO

LINE and DESK

RAY BLAIN, Editor

Q. Should the 24-volt battery lead from the storage battery rack to the power panel and to the switchboard, in a small exchange, be inclosed in conduit?

A. We would say that ordinarily this need not be done if good rubber covered braid wire is used. The insulated wires may be laced direct to cable runways which makes a much neater job than conduit. All battery circuits regardless of how they are run should be fused properly.

Q. What method of switchboard plug polishing would you recommend which is convenient to use and still does not cause injury to the plugs?

A. We are sure that you will find any of the approved types of plug polish entirely satisfactory. However, care should be exercised to remove all of the polish from the plugs cleaned. A special polishing cloth for cleaning switchboard plugs can be obtained which will prove a real convenience. This cloth will not damage the plugs in the slightest.

Q. What is considered the best method of protecting aerial cable from large tree limbs?

A. This can ordinarily be accomplished by one of two methods. Make use of a pull-off to the trunk of the tree. This arrangement is provided by placing a short length of galvanized wire from the messenger to a screw eye in the tree and used to pull the cable free of the offending limb. Or a short guard may be placed on the messenger at the limb in such a manner as to swing the cable in the clear.

Q. We are planning on using a filtered, alternating current, power supply to supply current for the operation of a small telephone exchange to avoid the maintenance of a storage battery. Would you consider such an arrangement satisfactory?

A. Such filters to convert alternating current to direct current of the proper voltage to operate a telephone system are now available and are being successfully used to operate many small telephone systems. Some arrangement must be made, however, to supply current from a standby battery during power failures if continuous telephone service is desired. When the system is small and failures of the commercial power infrequent, a dry cell battery is often successfully used to provide uninterrupted telephone service. Some such filter arrangements have a relay built-in which automatically switches the telephone system to the reserve battery during power failures.

Q. In the construction of a new underground cable plant we have a need for over 600 cable pairs in one area and are debating as to whether we should make use of a 900-pair cable or two smaller sizes. Have you any suggestions to offer which might be of help in this matter?

A. While the use of 900-pair cable is entirely satisfactory in such a case we are of the opinion that it would probably be desirable for you to make use of two smaller cables. Two 400-pair cables would no doubt do a better job and make distribution easier without adding much to the cable splicing cost. Proper stubs should be provided in each manhole where additional cable capacity may be required to avoid opening splices on the main cables at a later date. We would suggest that at least four ducts be provided in all runs where two cables are installed. This will care for a reasonable future expansion and provide ducts to be used for cable replacement in event of trouble where a total failure of the cable does not occur.

Q. How deep will the ordinary wire plow bury wire and what power will be required to haul it?

A. One type of plow is capable of burying two wires to a depth of 20 inches and requires a drawbar pull of approximately 8000 pounds, to haul it. This will differ naturally in various localities.

Q. Can you advise us whether it is possible to obtain a cable splicing trailer equipped with pneumatic tires and all-metal wheels?

A. Yes such a trailer is now available equipped with metal disc wheels. This particular trailer is also opened by lifting the top which is hinged on one side.

Q. Will it be possible to use an earth boring machine to excavate holes for the installation of anchors?

A. The modern earth boring machine may be set at a proper angle for boring anchor holes. This machine can be used to advantage and will make considerable saving possible when used to excavate both pole and anchor holes on a large pole line job.

Q. Are recessed conduit openings into manholes considered necessary for underground telephone construction to make a finished job?

A. While not absolutely necessary they are ordinarily considered desirable for use with large cables as they permit a longer bend. End bells are often used in lieu of recessed openings for terminating fibre and the various types of cement-asbestos conduits in manholes. This likewise proves a very good arrangement and makes a nice looking job.

Q. Should a telephone construction truck in all cases be equipped with a power operated winch?

A. In our opinion it should be as the winch may be used for so many things in connection with general construction work. Some light weight construction trucks are not equipped with winches though ordinarily they are used as the second truck in a gang, the first and larger truck being equipped with a winch.

Q. What is the advantage of using steel pins instead of the ordinary variety in crossarms?

A. The only reason we know is that they provide a greater strength than wood. It is doubtful however, that this extra cost can be justified except where greater strength is required as on deadend poles. This extra strength will often permit the use of a single crossarm with an angle iron back-brace in lieu of a double arm for a regular deadend.

Q. What type of jumper wire is recommended for use in the average exchange?

A. Several types of jumper wire reels are now available which are suitable for use in any telephone exchange. Some types of reels mount on the wall or the main frame itself. Another type of reel which has proved highly desirable for this work is a portable type which sets on the floor and may be moved about the main frame while running jumpers.

WHEN YOU ORDER UNPROTECTED CABLE TERMINALS

BE SURE TO ASK FOR

COOK XB

You'll get ALL the features you want in an unprotected terminal: design that assures ease of installation, quality of materials and construction that means dependable service, low maintenance cost.

- **Tight fitting hood.**
- **Exclusive weather guard for drop openings.**
- **Strong moisture-proof cable connection.**
- **Protection against weather, condensation, dust and insects — an exclusive feature.**
- **Light, compact, fits close to pole or wall.**
- **Reversible, cable out of either top or bottom.**
- **Made in 6, 11, 16 and 26 pair sizes.**

TERMINAL AND PROTECTION EQUIPMENT

★ COOK ★

COOK ELECTRIC CO., 2700 SOUTHPORT AVE., CHICAGO

This machine makes cable hanging easier and better...

This new cable ring machine performs eight precision bending and cutting operations in less than a second to form the size and shape of one Chance Cable Ring.

Many months were required to perfect the intricate, precision mechanism of this machine. Many tests and experiments were required to see that the rings produced had all the desirable features that could be built into a cable ring. The results have been gratifying, for this perfected cable ring is easier to install, holds tight to the messenger without slipping or jumping off, and reduces sheath cutting to a minimum, because of a smooth rounded bearing surface and smooth galvanizing.

Chance No-Tangle Packed Cable Rings are easy to install because the spiral gripping hook permits a leverage action and minimizes the need for gripping the ring. "A twist of the wrist and they're on."

WRITE FOR DETAILS AND PRICES

A·B·CHANCE CO. CENTRALIA MISSOURI

Short Course in Telephone Transmission

(Continued from page 25)

a repeater would be an open wire line extending between two telephones, the line being exactly the same construction throughout and containing no intermediate or terminating cable, no change in wire size, or any condition which would affect the impedance conditions along the line. As it is expressed in transmission work, the impedance of a line should have no irregularities. An **impedance irregularity** for example would be a length of loaded cable which might appear in the middle of a long open wire toll circuit due to a cable entrance in and out of some major city. Impedance irregularities result in the **reflection** of the voice waves which causes "singing" of the repeater if the gain exceeds some critical value.

Four Wire Repeater Circuits

Due to the inherent difficulties in making precision balancing transformers and networks it is inevitable that in every two wire repeater there is a small amount of unbalance in the repeater itself. That is, some of the energy from the output circuit of the amplifying element will reach the input circuit of the other amplifying element, thus limiting the maximum gain that can be derived from the repeater. The efficiency of the modern two wire repeater is such that can be used successfully, however, without undue difficulty from the inherent unbalance just mentioned on both long and short open wire circuits. However, in connection with cable circuits which have a much higher attenuation than open wire circuits the inherent unbalance in a two wire repeater is somewhat objectionable. In order to provide higher gains at repeater plints which are frequent on long toll cable circuits the four wire repeater was developed. The four wire repeater is essentially a system rather than a single unit. This system requires that two cable pairs, one cable pair being used to transmit in one direction, the other in the opposite direction be used. Two amplifying units, which are nothing more or less than simple one way amplifiers are inserted in tandem in each of the cable pairs and so that they amplify in the desired direction only. At the terminal end of a four wire system what is known as a **four wire terminating unit or circuit** is used to convert the incoming and outgoing four wire circuit to a two wire basis. Figure 8 illustrates schematically in block diagram form

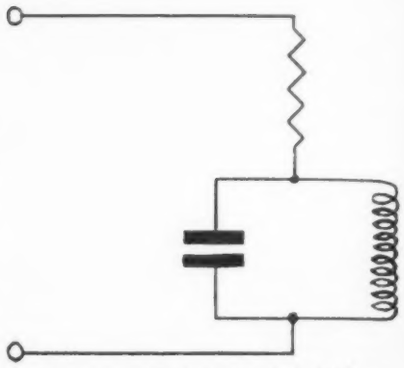


Fig. 7—Network for Loaded Cable

the essential features of such a system. Inspection of this circuit will show that it is essentially no different than the two wire circuit as far as amplifying principle is concerned. The amplification which is contained in a single tube in the two wire repeater is spread out in a number of separate one way amplifiers in the four wire type.

THE obvious advantage of such an arrangement is the higher degree of balance that can be obtained on a long circuit as even on a coast to coast circuit only one set of balancing networks and transformers would be needed. Four wire repeaters generally appear every fifty to 100 miles along the cable. It would seem that unlimited amplification could be obtained with this arrangement thus extending the distance possible between repeater stations, however, there is a practicable upper limit to which amplification can go for if the incoming energy is allowed to fall to too low a value, then cross talk and noise which is present on every cable to a limited extent would be amplified along with the extremely weak voice currents and might be objectionable. Likewise if the outgoing level impressed on the cable pair by the one way repeater is unusually high the cable pair would tend to cross talk into other pairs and thus cause difficulty. Four wire repeaters generally use two tubes in tandem and have gains as high as 40 decibels.

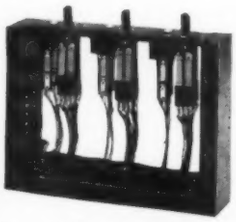
(To be continued)

Phone Firm Plans $40,000 Building

BELLEVUE, O.—Work will begin here shortly on the new $40,000 building which will house the main offices of the Northern Ohio Telephone Company, William C. Henry, general manager and secretary of the company, announced.

The building will be of brick, and will be air conditioned and accoustically treated. The company has 48 exchanges in northern Ohio.

Base section of Stromberg-Carlson Multiple Line Key Turret Equipment



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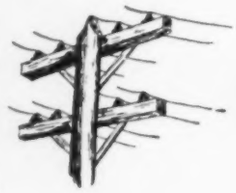
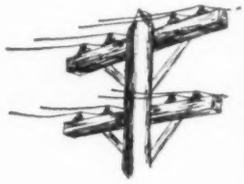


LONG LINES

R. A. Clark, Jr.



Radio Communication For Utilities

The use of Radio by Utilities is becoming increasingly important. Up to date information will be presented on this interesting subject during the next few months by Mr. Clark, in these columns.

THE development during the past few years of high frequency radio has opened up a much greater field for telephone communication than heretofore. The art has now progressed to a point where reliable radio communication may be had with simple and light equipment and as a result utilities are finding many applications. In view of the interest shown and the possibilities for using radio I would like to devote a few articles to this new and interesting subject. I am indebted to Mr. J. G. McKinley of the West Penn Power Company for much valuable information on recent developments in this field.

In June, 1936 the Federal Communication Commission held a conference to obtain information as to the value of radio for application by the various utilities interested. Assignments in the high frequency group were made based on the information obtained in this conference among which were a group of seventeen bands for emergency use by the utilities and others requiring such service. While some of the utilities notably the telephone and power companies have obtained licenses for specific point to point applications, the main interest is being shown in the emergency bands; licenses for this service can be obtained without great difficulty.

It has been rather difficult to define what constitutes an emergency and I believe the Commission will take a reasonably liberal attitude providing of course that the utilities do not abuse their privileges. The frequency assignments are such that a great number of emergency stations can be operated on any given frequency with little or no interference between them. In general the emergency service is for relatively short distances, i.e. from 5 to 25 miles. The general scheme commonly used employs a fixed station and one or more semi-mobile stations which can be moved to locations as required. Other applications utilize two mobile stations.

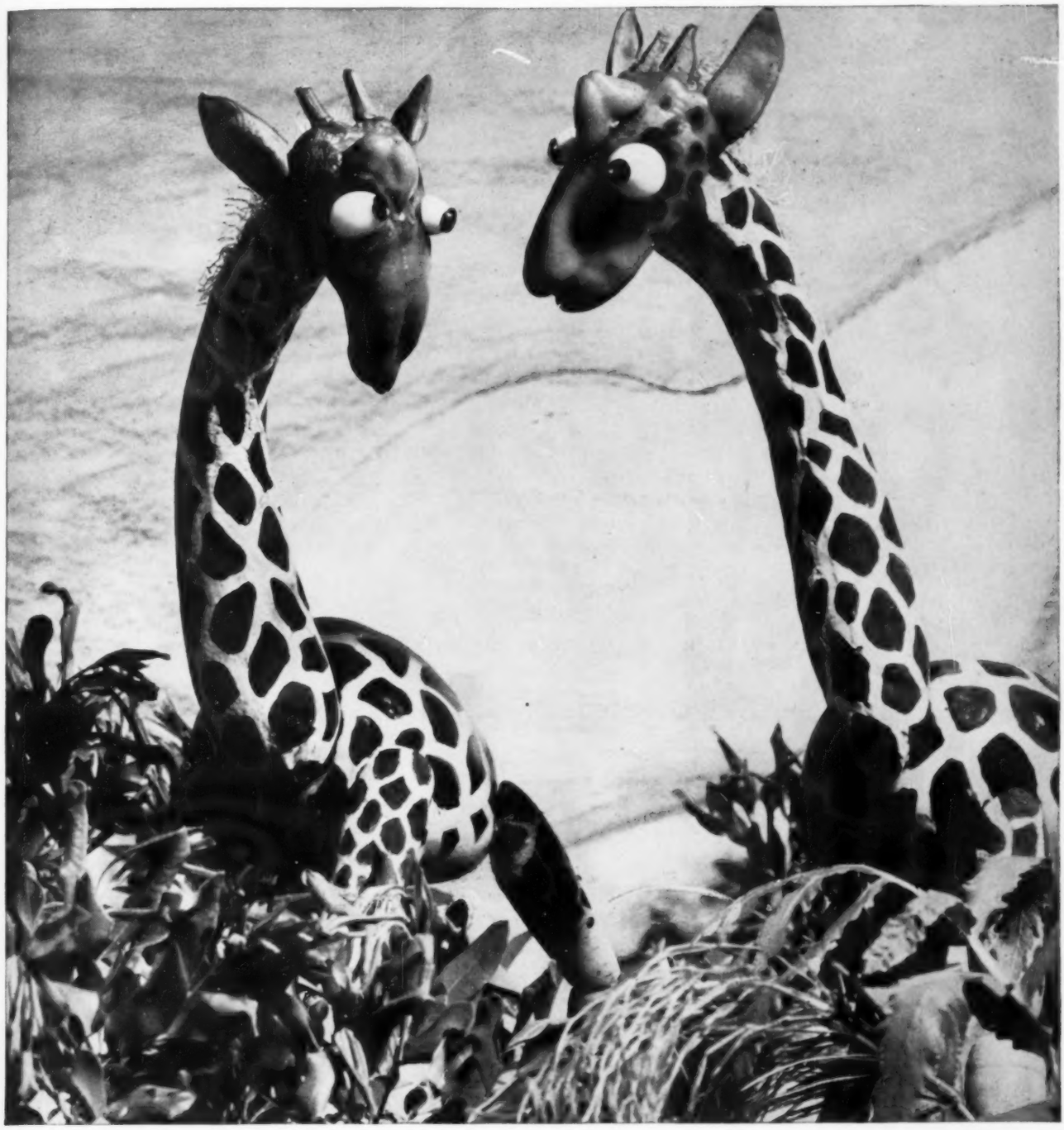
No station will have exclusive use of any of the assigned frequencies and for this reason the utilities making use of emergency radio must cooperate so that the service will be of utmost value to all. It is extremely difficult to define emergency service, however I believe and these are my personal views, that the following examples will illustrate what can be termed an emergency. In the power company field if a high voltage wire falls down on the road or street this would be an emergency and communication to clear the line and restore service would be considered within the intent of the license. If a power transformer failed thus disrupting service to a large number of customers this would be an emergency and would justify radio communication.

IN THE railroad field if a train dispatching wire failed thus disrupting train schedules and possibly causing hazardous conditions there would be an emergency justifying the use of radio. If a pipe line transporting gasoline broke thus resulting in hazardous conditions in the surrounding territory this would constitute an emergency.

If the utilities cooperate and do not impose on each other, or interfere with other radio using agencies I feel confident that there will be no difficulty. On the other hand if the channels are used for purposes not essential in the conduct of the utility business, the Federal Communication Commission will undoubtedly impose strict requirements thus preventing the utmost use of the radio facilities.

Radio facilities should not be used as a substitute for wire communication. Neither should they be used merely for convenience or economy, however there are many applications where radio furnishes the only means of solving certain communication problems and I believe there are sufficient channels available so that where the need can be demonstrated clearly and forcibly the Commission will arrange to permit sufficient frequency bands for the purpose.

AT THE present time there are only a limited number of frequencies available. If the legitimate use of these frequencies shows that they are insufficient it will undoubtedly be possible to secure additional ones. On the other hand if full use is not made of the allocated frequencies they will be assigned to other services that do need and will use them. Some of the utilities, notably the railroads, have been lax in the development of radio communication for their use. At the engineering conference with the Federal Commission mentioned above, the



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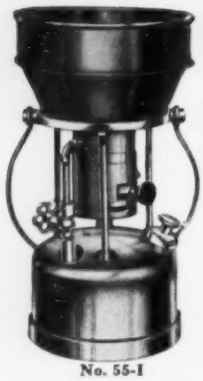

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railroad companies failed to appear or to make a showing as to their need of frequency assignments. As a result, no frequencies were allotted to the railroads. It will therefore be much more difficult to obtain railroad frequency assignments for communication such as between the front and rear of trains and from trains to the dispatcher than it would have if the railroads had stated their case and gone ahead with the development of this service. However this has not closed the door and the Commission will undoubtedly issue licenses for such services when proper application is made.

The history of radio communication has shown that once a service is developed and effectively used this service will not be deprived of the necessary frequency assignments. If sound principles are followed in the development of such services there is no reason to believe that those who make effective use of it will be deprived of the frequency assignments necessary for adequate service.

AERIAL CABLE MAINTENANCE

(Continued from page 18)

clamps should always be placed so as to not interfere with splices or cable terminals. Grade clamps may also be used to advantage to hold a cable in place around a corner to prevent it from pulling tight against a pole or other fixture. Grade clamps should always be placed near each pole of a railroad crossing. They should also be used to hold the cable in place on a deadend pole where the aerial cable connects to underground. This is true on poles where an FX box is installed or where the cables are connected straight through with the customary smaller gauge choke in lieu of protection. When a grade clamp is used one cable ring is ordinarily omitted and the rings spaced from it on the messenger.

The new metal strap type of cable hangers are now being successfully used to support splices in aerial cable. One advantage of this arrangement is that it is permanent and need not be replaced frequently. The failure of a tie at a splice often causes a splice to fail and consequently supports are most important. This hanger arrangement is considered much superior to the ordinary tie arrangement as commonly used. However, the tie may be used and some prefer to make it with No. 16 gauge, annealed, tinned copper wire. Others use soft galvanized iron wire of the same gauge. We also know of one exchange where all splices are tied in place with No. 17 copperweld insulated drop wire and they have found this arrangement to be entirely satisfactory after several years use. In the old days marlin house line was used for this purpose which proved successful except for the fact that it had to be replaced rather frequently.

Bonding Aerial Cable

AERIAL cable should always be well bonded to its supporting messenger at regular intervals. Some claim that this bonding is not necessary due to the fact that the metal rings keep the cable in good contact with the messenger. However, experience gained over many years indicates that this is not a fact and that the loose contact of the rings can cause a serious burn from induced current of lightning. Special clamps may be obtained for contacting the bond wire to the messenger or an ordinary 3-bolt guy

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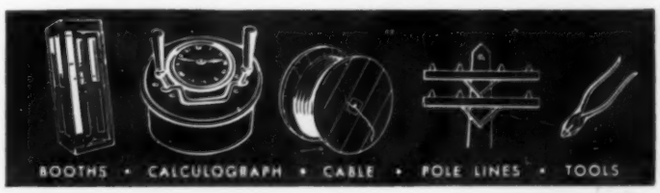

clamp may be used for this purpose. Protected type cable terminals are now commonly grounded to messenger strand instead of running a separate ground wire and connecting it to a ground rod. This method was frowned on just a few short years ago but is now ordinarily accepted as good construction practice.

Guard used to protect cable over a street railway trolley.

The Installation of Guards to Protect Cable

AERIAL cable should always be well protected from mechanical injury of all kinds. Guards are generally used to prevent injury from large tree limbs or from accidental contact of a trolley pole. These guards may be made from four boards to form a square box or special guards may be purchased with grooves cut in them to fit both the cable and the messenger. Wood conduit is also occasionally used as cable guards and it proves quite successful. Aerial cable should also be protected at fire hazards by a suitable asbestos guard. When this is done a second messenger is usually placed to support the fire guard which covers both the cable and its regular messenger. Special fire proofing guards for this purpose may now be purchased at a nominal cost.

Routine Inspection of Terminals on Aerial Cable

THE outside cable terminals of any telephone system should be inspected at regular intervals and all necessary repairs promptly made. Care should always be taken to make sure that covers close tight and that screws which hold the terminal in place are all tight. Old, obsolete type cable terminals are often the cause of leakage and poor insulation and all located should be immediately replaced with a modern type. The back nuts on the punchings in a terminal should be tightened and a socket wrench used in preference to pliers for tightening the locking nuts when connecting drop wires. The face of all terminals should be cleaned with a non-metallic brush to remove spider webs and dirt which may cause leakage in wet weather. Markings to indicate terminal and pair numbers at each terminal will save much time for both installers and trouble-shooters in locating pairs.

The Routine Inspection of the Cable Plant

WHEN making a routine inspection of cable all conditions which could possibly cause trouble should be noted and corrected promptly. Often small breaks in the sheath may be repaired before they actually cause trouble. It is always a good plan to ride aerial cable in a cable car and make a careful inspection of the sheath. The new aerial ladder mounted on a truck will be found ideal for this purpose by all companies who can afford to own one.

The small carbon arc sets operated by a storage battery will be found ideal for the repair of small sheath openings or cracks. These repairs will be found to be just as effective as wiping on lead to repair such openings and it may be accomplished in much less time and at a reduced cost. Any telephone company will do well to investigate these arc sets.

It will be surprising the small amount of time that will be required to make these periodic inspections of the cable plant and the extent to which it will reduce cable trouble. Not only is cable trouble expensive but its accompanying interruption of service tends to create a feeling of ill will toward the telephone company. We are firm in the belief that these periodic inspections will reduce cable trouble in any exchange regardless of the condition of the plant. Even a new cable may develop trouble in a very short time if certain conditions are ignored. It is believed that all aerial cable should be carefully inspected at least once each year and twice is to be preferred in most cases. Any telephone company who follows this practice for a time we believe will be strictly in favor of preventative maintenance of their cable plant.

—END—

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New Wall Mounting Telephone Announced

Automatic Electric Company is now in production on a new wall-mounting Monophone—known as Type 50 and designed as a companion to the Type 40 desk Monophone introduced a year ago. Both models were featured in Automatic Electric's exhibit of modern telephones at the recent National Convention.

New Automatic Electric Type 50 Wall Monophone with Dial. Manual models are supplied with replaceable dial blank.

The cover of the Type 50 Monophone may be quickly removed, leaving the entire base assembly accessible for inspection.

Contributing to the transmission performance of these two telephones are several improvements which will be of particular interest to the operating engineer who is responsible for maintaining high transmission standards over local and long distance circuits. Among these are:

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DEPENDABILITY ASSURED BY PRECISION ENGINEERING

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"Tapping In" on Washington

(Continued from page 14)

ment of operators in the Independent field through greater mechanization, particularly unattended dial exchanges, the speeding up of work by the present experienced operators which would include elimination of rest periods and the general dislocation of the schedule of operators' wage increases through the establishment of a higher learner rate of pay. He stressed that the Independent industry throughout its entire history presented a marked contrast from the Bell System, because the Independents served the smaller cities and towns and rural areas with generally lower rates and the Bell companies the larger cities. The Independents could not seek higher rates to obtain revenues to compensate for their increased wage costs because rural subscribers would abandon their service, Mr. Agee noted, although Sam Houston, National Federation counsel, pointed out one example of an Independent obtaining higher rates due to the Wage-Hour costs as a means of relief.

Mr. Agee stressed that the learner operator should not expect and is not entitled to receive pay at the same rate as experienced operators. He brought out that the smaller communities had lower scales of wages than cities and had lower living costs so the learner wage below the 30 cent minimum was in keeping with pay for similar work in the smaller places. In other occupations such as stenography, the girls paid for their own training while in the telephone industry they were given pay as soon as they started learning their work. There was a trend already started because of the minimum wage for business schools to start operator courses and one Independent had established a summer school without pay for girls in high school.

Association Executive Vice President Pitcher told the Wage-Hour hearing that approximately 12,500 operators were employed yearly by the 2,100 Independent exchanges with 500 or more stations and twenty per cent of these operators were "learners."

The average period of instruction and training for these operators was 814 hours for local operators and 1,212 hours for toll operators, Mr. Pitcher stated. From the results of a questionnaire sent by the Association to the Independent industry the average proposal for the learner wage rate was 67½ per cent of the 30 cent-an-hour minimum, Mr. Pitcher testified. This meant an additional wage cost to these exchanges, if the exemption was denied, of $250,000 a year, Mr. Pitcher declared, while Mr. Agee later noted that if 30 cent wages were retained there would have to be a proportional increase of wages for experienced operators which would make the total additional cost to the Independent industry of about $1,000,000 a year, Mr. Pitcher estimated that the average investment of a company in a student operator was $125. He told the Wage-Hour Division that Independent companies averaged two exchanges to a company.

Association Wage-Hour Committee Chairman Agee joined with another Independent witness, L. F. Shepherd, Central Division Traffic Superintendent of the General Telephone Companies, that the larger Independents could pay a higher starting wage than the smaller companies. Mr. Shepherd estimated his companies could pay 70 to 75 per cent of the minimum for the first three months and increase that amount for the remainder of the first year of work up to the 30 cent rate. Both Mr. Agee who noted the dial service was an Independent manufacturing development and Mr. Shepherd warned the Independents were now surveying the advantages of dial service from a cost standpoint, being able to absorb the initial investment through their depreciation. Miss Mayme Workman, Illinois Telephone Association Traffic Supervisor, gave an interesting and detailed description of the training of operators and said that three months was needed for local work and more time for toll instruction.

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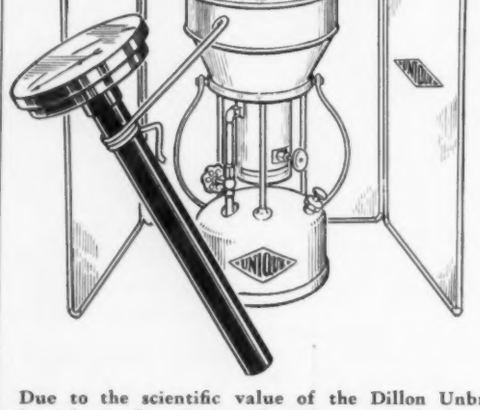

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Kansas Holds Rural Service School

A Rural Telephone Service School was held on Dec. 1 and 2, at Kansas State College, Manhattan. The purpose of this two day course was to give practical instruction in the theory and servicing of rural telephones, telephone lines, and central office. There was no cost and the attendance was gratifying.

Lectures and demonstrations were used. B. C. Burden, engineer of the Lincoln (Nebr.) Tel. & Tel. Co. and feature writer for TELEPHONE ENGINEER was a feature speaker.

Obituary

Edwin D. Schade, 72, Johnstown, Penn., for many years manager of the Johnstown Telephone Company, died November 4th at his home in Johnstown. A real Independent pioneer with a record of success, his death has been widely heralded through the press. His passing marks the loss of an Independent who has been active most of his business life fighting for telephony and especially the Independents. On his retirement in 1930 when the Pennsylvania Telephone Corporation purchased the Johnstown exchange, Mr. Schade retired with many honors. He was a president of the former Western Pennsylvania Independent Telephone Association and was later instrumental in creating the present State association, and served as its first president. In addition, he served for many years as a director of the National association.

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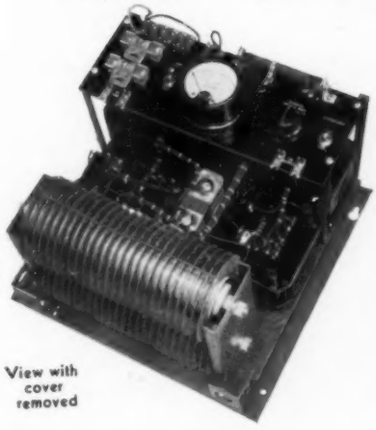

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Beginning the first of the year, Mr. Nelson D. Stoker will contact telephone companies, covering the entire territory east of the Rocky Mountains, for the James Kearney Corporation, St. Louis manufacturers of a line of telephone accessories.

Mr. Stoker, who joined the Kearney organization recently, is a graduate engineer of Washington University and has had special courses in engineering at M.I.T. in Boston.

After receiving his degree, he engaged in practical experience, serving his first three years as a lineman; then

Nelson D. Stoker

station installer, station repairman, dial central office maintenance, transmission testing and quality supervisor for outside construction, cable splicing and station repairs.

Mr. Stoker, who has also had experience in design of various telephone line accessories and tools, expects to cover some 25,000 miles during the coming year in introducing to the field some new and improved products now produced by the Kearney Corporation.

Cable Hanger Proving Popular

At several of the recent telephone conventions there has been much discussion over the various types of cable hangers. This month one of the feature articles of this publication is devoted to "Aerial Cable Maintenance" authored by Ray Blain.

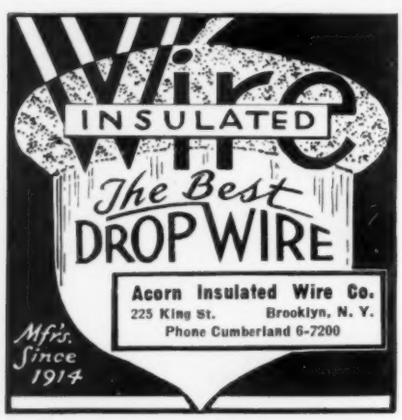
Pictured is the Davidson type cable hanger manufactured by the Reliable Electric Company, 3145 Carroll Ave., Chicago. The illustration is quite vivid as to principle. The resultant economies in elimination of larger maintenance costs and service interruptions are evident. In principle the Davidson type cable hanger ties the cable snugly to the messenger and eliminates "snaking" or "creeping" which causes many sheath failures on small cables.

To get full particulars, samples and construction specifications please address Reliable Electric Company, 3145 Carroll Ave., Chicago.

Paine Appoints New Representatives

The Paine Company, Chicago, well known manufacturers of anchors for every construction and installation problem, and electrical and building specialties, have recently increased their national distribution with the selection of additional representation in some of the key cities of the United States.

Top, left, is L. M. Wood of Wood and Anderson Company, St. Louis, a Missouri corporation. Top, right, is



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Warner Jones, president of the Warner Jones Sales Company, Cleveland, Ohio. Mr. Jones was the first salesman for the old Nungesser Carbon and Battery Company.

Lower left, is the newest of the Paine representatives, Hamilton Hart of Atlanta, Georgia, while lower right is H. W. Goetzinger of Pittsburgh.

Harry P. Smith of the Harry P. Smith Company, represents Paine in the Minneapolis territory. Other representatives recently appointed are Robert Feeney of Kansas City, Missouri, who will cover Kansas, Nebraska, Iowa and Western part of Missouri; Jack Miner, Detroit, who covers Michigan and Northern half of Indiana; and Herb Kaub of Denver, covering Colorado, Montana, Wyoming and New Mexico.

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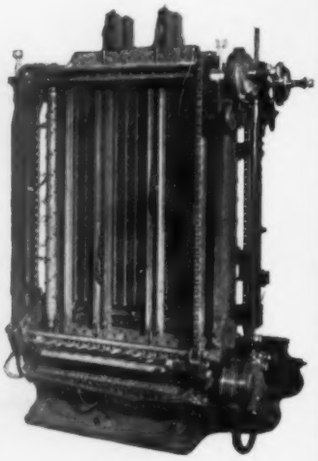

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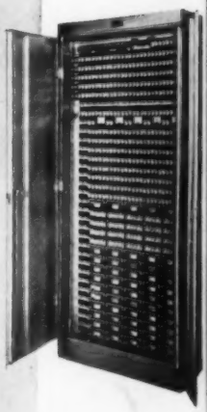
Attest:

Law Examiner.

Thomas E. Robertson
Commissioner of Patents



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